

Radio Resource Management in Indonesia: Report and Recommendations

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May 25, 2004



GROWTH THROUGH INVESTMENT, AGRICULTURE AND TRADE (GIAT)*

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1. INTRODUCTION AND TERMS OF REFERENCE

This report is based on a consulting assignment conducted in Jakarta during May 2004 dealing with *Radio Resource Management in Indonesia*. The report's first objective is to consider and evaluate, in the context of national policy goals, a) alternative frequency pricing arrangements reflected in practices and trends in other countries and b) current approaches and formulae for setting frequency fees in Indonesia. In that context, the report considers the rationale for different approaches; different technical and economic elements underlying different fees; and, the contribution of fee elements and formula components to achievement of overall telecom policy goals. The results of this review were presented at the *Workshop on Radio Resource Management for Economic Growth* held on 4 May 2004 at Indosat Offices.

Based on that review and consistent with national goals in Indonesia, the second objective of the report is to provide a) specific recommendations for establishing a spectrum use fee in Indonesia for provision of wireless local loop services with limited mobility – the Telkom “Flexi” Service (Short Term Task) and b) guidelines for establishing revised radio resource management scheme including guidance for modifying or replacing the existing formula. (Long Term Task)

This report is organized in five sections. Section II summarizes recommendations on the short-term question of the appropriate spectrum use fees for mobile services, and on longer-term issues relating to the direction of spectrum management reform in Indonesia. Section III reviews major spectrum management approaches in other countries. Section IV discusses the five major issues involved in determining spectrum fees and the critical role of goals in resolving those issues. A benchmark set of goals and their relative weights is also proposed. Section V addresses the question of the appropriate fee for the mobile service based on fixed wireless access with limited mobility. Section VI considers some potential changes to the long term spectrum management program in Indonesia.

2. SUMMARY OF RECOMMENDATIONS

The first, overarching recommendation of this report is that the government adopt a set of policy goals, , for determining future spectrum policy along the following lines, and with the notional, indicated weightings:

- Goal One: Increase investment in telecom infrastructure and expand the number of connections to the public switched network; (50%)
- Goal Two: Assure fairness and economic efficiency; (25%)
- Goal Three: Adequately compensate government for use of spectrum; (15%)
- Goal Four: All others. (10%)

Secondly, in consideration of the arguments and views of stakeholders and the ranking and weighting of different policy goals, it is recommended that the fee for fixed wireless access with limited mobility should be set “in the neighborhood” of 0.6 times the fee for cellular CDMA. This can be achieved based upon changes to the power index and bandwidth index, and otherwise consistently with the interest of the market as set forth in Chapter II, Article 3 of Number KM. 40 of Year 2002.

Third, the fees for GSM and cellular CDMA should subsequently be revised downward to achieve approximate equality with the fee for fixed wireless with limited mobility services. This revision recognizes that in the longer term all technologies will be used to produce very similar and competitive services. Thus, it is important that the structure of government fees NOT determine choice of service, provider or technology.

Fourth, with regard to longer term spectrum management reform, this report recommends:

- Adoption of the weighted policy goals outlined above with special emphasis on encouraging investment and increased teledensity, while focusing on economic efficiency and fairness as discussed below;
- Undertaking an engineering/economic review/critique, in the context of the goals set forth above, of existing spectrum assignments among technologies and services with the goal of revising the same where the expected benefits reasonably exceed the expected costs of doing so;
- Undertaking a careful reevaluation of current licensing arrangements for consistency with the weighted policy goals set forth above while paying particular attention to the use of incentives in licenses and making licenses consistent with fee structures;
- Modifying or replacing the current fee determination formulae established in 1997 and revised in 2000 in ways designed to:
 - reflect greater emphasis on policy goals adopted;
 - reflect specific concern for improving teledensity;
 - reflect a more value-based, “benefits” orientation to complement the current approach dominated by engineering considerations;
 - reflect a more efficiency- and incentive-based system by eliminating certain features from the current formula and adding others;

- make the fee structure more flexible and responsive to techno-economic, market and regulatory changes;
- allow careful differentiation among different telecom sectors (e.g. broadcast v. cellular) and different types of spectrum use (corporate uses for internal business purposes v. commercial uses in producing services for sale); and,
- make the fee determination schedules simpler and clearer.
- Introducing spectrum management costs (direct and indirect) to the government as an element of the fee structure and earmarking (assigning) fee proceeds from that element for use by spectrum managers to monitor spectrum use, conduct spectrum studies, upgrade and maintain spectrum related data bases; and, for enforcing compliance with license terms and regulatory policies.

Finally, it is recommended that this report and its recommendations be made publicly available, and that the government solicit comments on it as part of the decision-making process in determining the correct fee for fixed wireless services with limited mobility.

3. GLOBAL TRENDS IN SPECTRUM MANAGEMENT PRACTICES

No short summary can adequately describe the details of recent spectrum policy developments in other countries, and several written reviews of policies and practices in different countries are available.¹ This report simply calls attention to some of the main features in other countries as they relate to current efforts in Indonesia.

Global Spectrum Management Reform. Countries worldwide continue to undertake revisions of spectrum management approaches in response to: new developments in technology (impacting wireless and mobile telecoms in particular); changing production costs; increasing demand; and, most importantly, the realization that spectrum-based telecom infrastructures are critical to national economic development and growth. Revisions are taking place in four main areas:

- ▶ Frequency (re)allocation among different technologies or services;
- ▶ Services licensing and assignment of rights to use particular frequencies;
- ▶ Establishment of rules governing use; and,
- ▶ Monitoring spectrum use, and enforcing compliance with rules.

¹ Importantly in this regard, Study Group 2 of the ITU Development Group has for the past several months been gathering information from administrations in developing countries and preparing a report on Resolution 9 and Question 21 which address specifically different approaches to spectrum management and fees for spectrum use in developing countries. The results of this effort, according to Mr. Terence Jeacock (terence.jeacock@ties.itu.int) the official in charge of the report, will be posted shortly to the ITU Website.

While spectrum access and usage fees are elements of the terms and conditions of the right to use spectrum, such fees should be considered an integral part of the overall spectrum management program. For example, fees may be tied to, and varied with, the conditions of the license; or, the level of fees may vary with the need to monitor and enforce compliance with license conditions and general spectrum rules. Services licensing, fee-setting and specification of rights to use spectrum are pivotal points of global spectrum management practices and reforms.

Economic Benefits Assessments. In the course of reforming radio frequency management approaches, the majority of countries have introduced methods of economic assessment of the value of spectrum. This “economic benefits” approach takes several forms, but almost all of them recognize a) the value of alternative uses of scarce spectrum (opportunity cost of specific allocations) and b) the direct and indirect contribution of radio-based telecommunications services to countries’ overall economic development and growth. Weighing the economic benefits of alternative spectrum management approaches is particularly important in the context of rapid changes in radio technology, and shortening of product development cycles. The result has been to increase demand for spectrum; shift demand for, and value of, spectrum in different services, and; generally to increase the role of radio-based telecommunications services in a country’s overall economic growth and development.

Spectrum Rights Developments. A major development accompanying recognition of the economic benefits of spectrum use has been increased emphasis on defining and assigning new property rights in spectrum, and, in a few countries, use of spectrum auctions to monetize spectrum value for government uses. Results of auctions to date have been quite mixed in the US and in Europe. Most countries have declined the use of auctions in favor of other approaches.

Best Practices. There is no single set of “best practices”, or an “optimal” fee level and structure that could simply be transferred to and adopted in Indonesia. Best practices and optimal fee levels/structures depend on national circumstances. They are linked to national goals; the stage of economic and telecom infrastructure development; and to the constraints of national history and prevailing institutions.

These conditions differ across countries, and are reflected in unique radio resource management approaches. While many goals are common to all countries, and shared by Indonesia, the emphasis on different goals, and trade-offs among them, is unique to each country. Put simply, what is optimal in the context of one country’s goals and political constraints is not necessarily good or optimal for adoption in another country such as Indonesia. Indonesian policymakers can learn from successes and mistakes in other countries, but in the end they must establish their own policies and practices based on Indonesian political values and institutions.

Variety of regulatory fees, charges, assessments and taxes. Charges imposed by government on users of spectrum have many different names. They are also imposed for a variety of purposes. Frequently there are separate fees for licenses (which describe terms and conditions and rules governing carrier conduct and service provision), and for the use of spectrum. In practice, the lines between these may be clear or blurred, depending on the country. It is necessary though to keep the rationale for the two different types of charge in mind.

Diversified Goals. Spectrum management goals are generally grouped into those that satisfy overall national policy goals, and those that relate to economic or engineering efficiency in the use of specific spectrum bands. The most notable development in global spectrum policy has been the evolution from (a) predominantly technical approaches designed to minimize interference, and to optimize the deployment of different technologies according to their technical parameters, to (b) more policy-oriented, economic value based approaches that are driven primarily by recognition that spectrum management alternatives have very important effects on larger telecom policy and economic development goals. The latter approaches are characterized by greater weight being laid on the economic benefits of different spectrum management schemes and fee structures.

Different bases and formulae for fees. In addition to being set on the basis of different goals and for different purposes, the level and structure of fees is derived from quite different bases. Thus, fees may be based on:

- ▶ Costs, direct and indirect, related to processing or enforcement;
- ▶ Value, based on different measures;
- ▶ Teledensity, and other public policy considerations; and
- ▶ Political considerations (including budget needs, exclusivity, small business “discounts”).

A common form of fee formula includes consideration of a) the direct and indirect cost to the government for various licensing and enforcement activities plus b) various measures of spectrum value or opportunity cost. These considerations are variously estimated, weighted and combined in ways that reflect overall policy goals and institutions of individual countries.

4. DETERMINATION OF SPECTRUM FEES

a) Five Core Questions

Spectrum management practices vary from one jurisdiction to another, but they all address, in different ways, five core questions with regard to setting spectrum-use fees.

Core Question One. What shall be the overall level of fees?

In other words, what is the “correct” or “optimal” amount of wealth or income to be transferred from private sector entities that use the spectrum to the public sector/government

that owns and manages the spectrum? This is to be regarded as the limit on the overall amount of non-tax revenue to be generated by spectrum-use fees.

Core Question Two. How shall the overall fee “burden” be distributed among different spectrum bands, technologies, communications sectors and services?

The spectrum is used to provide widely differing services – broadcasting v. point-to-point; commercial v. non-commercial; terrestrial v. satellite, fixed v. mobile, and so on. Spectrum management authorities increasingly differentiate fees across these broad categories in accordance with telecom priorities and national goals. Fees are increasingly recognized as “burdens” on commerce, and are assigned where they will do the least harm to (create most value for) the broad national interest. Political considerations are often barriers to this kind of rationalization of the structure of fees.

Core Question Three: Who pays?

How shall the burden of fees be apportioned across different services, or assigned to particular companies? This question involves decisions about distributing the burden of fees across: new v. old technologies; incumbent v. new entrant firms; service to urban v. rural areas, and so on. In resolving this question, policymakers influence the allocation of investment and business resources to different technologies and sectors. Determination of who pays, and how much, is a critical economic function, and a key determinant of the rate of expansion of connections to the PSTN.

Core Question Four: What “formulae” are used to calculate fees?

In other words, what bases (economic, technical, political, policy) shall be used to determine the level of fees for a particular service or firm? As discussed above, fees are typically determined by a combination of cost and value parameters, much like the current scheme in Indonesia.

Core Question One 5: How will the proceeds be used and by whom?

A critical issue to be resolved is where collected funds actually go, and for what purposes they are used. It is common for fees to accrue with other tax and non-tax revenue in the government’s general fund. However, there are precedents for “earmarking” proceeds from fees for use in general telecom development funds; for universal service purposes; and, among others, for covering for the costs of regulation and spectrum management activities.

b) Radio Resource Management Goals in Indonesia

In his remarks opening the *Workshop on Radio Resource Management for Economic Growth* held on May 4, 2004, Dr. Djamhari Sirat, Chairman of BRTI and DG PostTel, concluded that

the overriding objective for spectrum management in Indonesia is to ensure that the spectrum is utilized and allocated to services that create the most benefits for the whole society. This objective reflects similar ones in other countries where terms like “serving the overall social good”, “maximizing total welfare”, “serving the public interest” express the same sentiment. It also underlines that there are many stakeholders (government, different kinds of producers and operators, large and small users, and others) with different interests and priorities.

Diversity of goals and stakeholders means that achieving such overall objectives for a societies as a whole requires “balancing”, “trading off”, “compromise”, negotiation, “give and take”, or “harmonization”. No stakeholder gets all, but all stakeholders get a fair share of the benefits of the valuable public spectrum. Every decision leaves some stakeholders disappointed, but all of them aware of having received some benefits.

Alternative policy goals. The following list offers several reasonable, possible goals for spectrum management in Indonesia. They are very similar to those embraced by policy makers in other countries. Furthermore, several were specifically mentioned by speakers and participants in the opening workshop, and in other conferences and consultations held with various stakeholders during the fieldwork for this project. They include:

- ▶ Improve efficiency;
 - Technical efficiency – less interference
 - Economic efficiency – more users, less waste, or fewer “white spaces”;
- ▶ Encourage investment;
- ▶ Increase teledensity; number of PSTN connections or promotion of universal service;
- ▶ Maintain fairness and consistency;
- ▶ Compensate citizens for use of public resource;
- ▶ Promote innovation in new services and new technologies;
- ▶ Increase manageability;
- ▶ Provide more flexibility;
- ▶ Reduce unwanted, unanticipated consequences of current techniques;
- ▶ Others:
 - ◦ Promote experimentation;
 - ◦ Compensate government costs;
 - ◦ Provide transparency; and,
 - ◦ Increase predictability.

Surveys of spectrum management programs in different countries show that all these goals are important. However, some are more important than others, and their relative importance may change in response to technological and market developments. Specific goals vary from spectrum band to spectrum band, from service to service, and in other ways. Stakeholders in the same country have different views of the relative importance of these goals. Also, some countries *rank* them by importance; others assign *weights* to each.

The importance of discussing and setting forth policy goals. One conclusion about goals is absolutely clear. If spectrum policy is to be consistent, transparent, effective, and goals fairly reflected in individual spectrum management decisions, it is absolutely critical that government officials, spectrum managers and other stakeholders form and express opinions about these goals – their relative importance, how to relate them to policy decisions, how to make tradeoffs and how to resolve inconsistencies and differences. Spectrum managers must recognize that all spectrum management decisions will require balancing and compromising among these goals and the interests of various stakeholders. Without clearly articulated government goals, it is not possible to achieve consistency, efficiency and fairness. The sector will also fail to attract risk capital, and so promote Indonesia’s larger economic development goals.

A baseline for spectrum management goals. Agreeing on goals is difficult even in principle. Agreeing on their relative importance and ranking is even more difficult. Deciding how to apply them is yet more so. However, such are the necessary conditions for effective spectrum management.

Based on the various goals being pursued in other countries and those suggested here for Indonesia, and conditioned by the overall objectives of economic development and growth the following baseline goals are suggested for Indonesia. They should serve as the starting point for debate and discussion among spectrum managers and stakeholders in the process of setting spectrum management priorities. Weightings are suggested for balancing these goals.

- Goal One: Increase investment in telecom infrastructure and expand the number of connections to the public switched network. (50%)
- Goal Two: Assure fairness and economic efficiency (25%)
- Goal Three: Adequately compensate government for use of spectrum (15%)
- Goal Four: All others. (10%)

The most important consideration should be attracting investment and expanding the number of connections to the PSTN (teledensity). All other goals should be subordinate. For reasons discussed more fully below it is important for spectrum management (fee setting, in particular) to be regarded as fair, and to contribute to economic efficiency. The level of compensation to the government is ranked third overall, but may be more important in the context of fees for services in areas of stable technology, and where the level of fees has minimal impact on investment in critical infrastructure. These three are offered as the most important, and, if properly reflected in spectrum management decisions, will satisfy in large part most other goals on the list above (under “Alternative Policy Goals”).

There can be and should be considerable debate and discussion about these goals. A case can be made to change the rankings and weights, and also to include others from the longer list. It is also true that the rankings may be different for different services, technologies and spectrum bands. That is to be expected. However, all stakeholders, analysts, regulators and

spectrum managers should recognize that all the goals cannot be fully achieved and that important trade-offs must be made.

It is absolutely critical to have that debate about the relative importance of different goals, and trade-offs among them, at the outset, in order to resolve major differences, and to achieve general agreement before moving to make specific spectrum management and fee setting decisions. In the next section, the weightings suggested above inform recommendation on the appropriate fee for fixed wireless access services with limited mobility of the type now being offered under the name “Flexi” by PT Telkom.

5. FEES FOR FIXED WIRELESS ACCESS WITH LIMITED MOBILITY

The short term task for this consultancy and report is to recommend a spectrum use fee for the Telkom “Flexi” service. This section first describes the background to the service, including current fee structures; then offers a set of recommendations; and, finally, summarizes the rationale for those recommendations.

a) Background / Current Situation

In the second quarter of 2003, PT Telkom, the dominant local wireline provider, launched a new service marketed under the name Telkom “Flexi”. The service was authorized under PT Telkom’s existing fixed service license. A key characteristic of the service is the ability of users to be mobile within limited areas – thus, the name, fixed wireless access with limited mobility (FWA with LIMO). The Flexi service is a hybrid service with some characteristics of a fixed service and some characteristics of a mobile service. As currently offered, it may be either a substitute for, or a complement to, other mobile wireless services (GSM or CDMA-based, cellular) provided by other licensed operators. In the long term it is likely to be a vigorous competitor to existing cellular services.

Thus far, for purposes of assessing spectrum use fees, the Telkom Flexi service has been treated as essentially a fixed service. It has accordingly benefited from interconnection and spectrum fees comparable to those for fixed wireline service. The authorization of the service, and its current regulatory treatment, are driven in large part by its similarity to fixed wireless service (with no mobility) and its ability to provide cheaper (than fixed wireline) connections to the public switched network. The fact that it is now, and will in the future be even more so, a competitor to other mobile wireless services (GSM and CDMA-based, cellular) provided by other licensed operators, raises important policy questions of fairness, efficiency, incentives, rates, and other issues of a public policy nature, with respect to the appropriate spectrum fee (and with respect to charges for interconnection.)

Law and regulations governing the fee. KM. 35 of Year 2004 provides several regulatory directions applicable to the fixed wireless access with limited mobility service. It states that

every provider of “wireless local fixed-line networks with limited mobility is obliged to pay costs associated with the right to the use of the frequency...” But, it also leaves determination of that fee and its specification to a separate Ministerial Decision.

KM. 40 of Year 2002, meanwhile, gives general guidance on the implementation of charges for the right to use radio frequencies (CRURF) in the provision of wireless technology-based telecommunications services. Notable in the context of the fee to be established for wireless local fixed-line networks with limited mobility are the following provisions:²

- ▶ CRURF shall accord with provisions of valid laws and regulations;
- ▶ Fees shall be established using elements of the current formula;
- ▶ Fees for a service shall be the same for both existing and new providers; and,
- ▶ The index of charges for bandwidth and power shall be based on:
 - ◦ Type of frequency
 - ◦ Bandwidth
 - ◦ Channel of RF
 - ◦ Extent of coverage
 - ◦ Location
 - ◦ Interest of the Market³

The present dilemma can be summarized simply. The current situation has operators providing similar, and in some senses competitive, services using similar but not identical technologies. However, the services pay very different interconnection and spectrum fees, thus raising questions about fairness, technology and service neutrality, incentives to increase teledensity, investment, innovation and other goals of both spectrum management and broader national telecom policies.

Current Fee Arrangements. Here we look at the spectrum fee situation for wireless local fixed-line networks with limited mobility, and the three similar, competing types of service – the broader approach to spectrum-fee setting is discussed in Section 6 below.

The current situation has suppliers of competing services that may be substitutes in the marketplace paying significantly different fees for use of spectrum to support their radio services. There are four types of services that differ according to the technologies used, the type of services rendered and the regulations imposed on them. These are: PT Telkom’s fixed wireless local loop with NO mobility; PT Telkom’s fixed wireless local loop with

² Chapter II, Article 3 of KM 40 of Year 2002.

³ The meaning of “Interest of the Market” is not spelled out in the Decree, but the term clearly refers to concerns about the fee’s economic or market impacts – presumably including economic fairness, investment, teledensity and roll-out of services, market incentives and other goals contained in the longer list of spectrum management goals presented earlier. However, the government’s view is that the current fees for other services cannot, as a result of previous government decree, be changed in the immediate term even if doing so would be consistent with the “Interest of the Market”.

limited mobility; cellular mobile services using CDMA technology; and, cellular mobile services using GSM technology.

Each of these services pays a different charge for the right to use radio frequencies (CRURF) without regard to whatever similarities they may have or to the extent to which they compete in the market place. The fees paid by different providers, and imposed on users of different services, also account for substantially different proportions of the retail rates for the services.⁴

Several different estimates were collected of the relationship between fees for these different mobile applications. For example, one consulting firm estimated that the fees for cellular CDMA are 35X the fee for wireless local loop, while the fee for GSM is 57X the fee for wireless local loop. Other estimates are of the a similar order. While estimates vary as to detail, all indicate significant differences in the level of fees paid by services that are increasingly competitors in the market place.⁵

The issue before the government is, given the current range, where to set the fee for the provider of wireless local loop with limited mobility – that is the CRURF for the PT Telkom Flexi service.

The level of that fee and its relationship to other fees for similar services has an impact on the achievement of the policy goals previously discussed. The higher the fee, the more revenue it generates for the government. Lower fees, meanwhile, encourage investment, the build-out of service, and expansion of the number of connections to the PSTN. The closer the CRURF for the PT Telkom Flexi service to fees for other competing mobile services, the more neutral is carrier choice by end users with respect to technology and service. A greater spread between the fee for like services means that fees, rather than the efficiency of the operators and the value of services they provide, may become the most important determinant of user choice, market share among sellers, earnings and investment. Accordingly, higher or lower fees for the fixed wireless with limited mobility service serve or disserve other goals noted above. Clearly, setting the fee requires achieving a balance among the goals listed above.

Positions of principal stakeholders. Several stakeholders are involved in the resolution of the short term question about the proper fee for WLL-LIMO services like the PT Telkom Flexi service. Their opinions about the correct fee vary substantially, and are based on different criteria and weights. Different opinions reflect the fact that the level of the fee in question will have different impacts on different stakeholders, and will serve or disserve different

⁴ It was not possible to make estimates of these differences due to the difficulty of obtaining the required data from operators in a short time frame.

⁵ The importance of these differences is reflected in either prices charged to end users, or in cash flow available to operators for use as investment in plant and expansion of coverage to more users, or in both.

policy objectives. These should be recognized and respected by spectrum managers. Ultimately, however, they must be balanced and harmonized in the interest of the market and the broader good for all stakeholders.

The *Ministry of Finance*, in the near term, generally prefers a higher fee, and would justify such a fee on grounds of a) fairness, b) the need for the government to be adequately compensated for the use of the public radio resource and c) simplicity. However, to the extent that the *Ministry of Finance* is concerned with growing the non-tax revenue base over time, it should also be sensitive to the fact that lower fees will encourage investment in telecom infrastructure, accelerate the build-out of networks, and increase teledensity. Such impacts should all help increase the future tax base and tax revenues. Thus, there is a trade-off between lower short-term non-tax revenues, and longer term tax revenues.

Providers of WLL with limited mobility prefer a lower fee. They argue that lower fees would encourage them to build out the service faster (leading to rising teledensity); that they are justified by limitations on the value of their services imposed by the restrictions on mobility (value of service considerations); and that there is a general need to encourage investment and innovation in the use of scarce spectrum.

Providers of CDMA-based cellular services prefer that their current charge, which some claim to be 35X the current fee for WLL with limited mobility, be reduced. Failing that, they would prefer that the fee for WLL with limited mobility be fixed at near the current level for CDMA-based cellular services. They argue that this position is based on considerations of fairness, technology neutrality and investment incentives – all of which they believe would improve under greater equality in the fee system.

Actual and potential users of all these services prefer lower to higher fees in recognition of the fact that lower fees generally translate into lower rates for spectrum based services, and into greater investment and innovation in such services.

Investors in spectrum based services prefer lower to higher fees. This is because higher fees paid by operators will typically lead to lower earnings, or reduced cash flow, and less funds available for long term investment. Lower fees mean more investment, more rapid service roll-out, and increased connections to the PSTN.

b) Recommendations for setting the fee for fixed wireless access with limited mobility

The following recommendations are based on a review of stakeholder positions, and on the recommended benchmarks for policy goals, both of which are set out and discussed above.

First, based on a consideration of the arguments and views of stakeholders summarized above, and on the ranking and weighting of different policy goals, it is recommended that the fee for fixed wireless access with limited mobility be set “in the neighborhood” of 0.6 times the

current fee for cellular CDMA. This can be achieved through changes to the power index and bandwidth index and in ways otherwise consistent with the interest of the market as set forth in Chapter II, Article 3 of KM. 40 of Year 2002. To do so will require the government to do the following:

- a) Estimate the average fee now being paid by operators of systems providing cellular services using the CDMA technology;
- b) Estimate the effects on the fee of different combinations of changes in the power and bandwidth indexes – particularly the power index; and,
- c) Specify the changes in the indexes necessary to bring about the recommended fee.

It should be noted that the recommendation is for a fee “in the neighborhood” of 0.6 times the cellular CDMA fee, thereby recognizing that the fee might be slightly higher or lower, and still be roughly consistent with the goals set forth.

Secondly, the fees for GSM and cellular CDMA should subsequently be revised downward to achieve approximate equality with the fee for fixed wireless with limited mobility services. This recognizes that in the longer term all technologies will be used to offer very similar and competing services. It is important that the structure of government fees NOT determine choice of service, provider or technology.

The end result of these adjustments will be to equalize the fee for fixed wireless access with limited mobility (which will increase), the fee for GSM and for cellular CDMA (both of which will decrease). This equalization implies that if the fee for fixed wireless access with limited mobility is increased by an amount smaller than 0.6 times the cellular CDMA fee, then the fees for the other services will have to be reduced by more to bring about equality. A larger increase in the fee for fixed wireless access with limited mobility would allow for smaller reductions in the fees for GSM and cellular CDMA.

Changes and equalization of fees are best undertaken fully and quickly. However, it is also possible to make the changes in increments, resulting in a “step by step” upward revision of the fee for fixed wireless access with limited mobility, and a “step by step” downward revision of the fees for GSM and cellular CDMA services. The end result is the same – fee equalization – but the timing is different.

Some concerns may arise about what might be called “unfair enrichment” of cellular operators should the amount they pay for use of the public’s spectrum be reduced, and the operators allowed to keep the reduced fees. To offset that concern, GSM and cellular CDMA service providers could be required to reinvest proceeds from fee reductions in ways that would increase system capacity, the number of subscribers served, and connections to the PSTN. Such a “quid pro quo” could, if necessary, be reflected in revisions to the terms of operators’ licenses.

c) Rationale for recommendations, and the ranking of goals

Establishing the CRURF for PT Telkom Flexi service is important for several reasons. First, it will resolve an important issue in the current marketplace, and, if done correctly, will give the right signals to producers and users of all the different services based on wireless technology. But, more importantly, resolution of the Flexi fee problem by the government will send important signals to the private sector about the government's understanding of the stakes involved, the government's spectrum management goals, and how specific fees will serve or disserve the various public policy goals.

As discussed above, several goals come into consideration in setting charges for use of radio frequencies. This is the case in both the short term and the long term. If stakeholders do not agree on the goals to be pursued, and their relative importance, they are very likely to come to different conclusions about the optimal spectrum management scheme, and about the "correct" fee to charge for use of spectrum to provide the Flexi service.

Thus, the ranking of goals is an important basis for the recommendations offered here. The ranking used seeks to capture the needs of the various stakeholders, and to produce the best deal for all the people of Indonesia. Careful consideration and debate of the rankings should lead to agreement that they capture the best deal for all, and that they endorse the fee recommendation given above.

Goal One: Increase teledensity and network investment. For wireless, mobile telecommunications applications, lower spectrum fees are better than higher fees. The argument runs as follows. Charges or fees for spectrum use will partly be reflected in higher prices for users in the market place, and partly in lower net income for operators. Thus, both users and producers of wireless services "pay" for the use of spectrum. Although higher fees generate more government income in the short term, they also discourage both increases in teledensity (by discouraging users from buying the service) and investment in these technologies (by reducing demand for the service and cash flow available for investment).

These negative effects are especially important for services like cellular mobile wireless services. This is because they represent the main hope for rapid increases in teledensity in Indonesia, where wireline penetration has been remained in the 3 – 4 percent range for many years. Higher fees mean lower teledensity. Lower teledensity defeats other economic development goals.

Lower fees will result in lower rates and more rapid take up of services by users. This will increase teledensity over time and create more investment incentives for operators. The benefits of greater investment and lower rates for wireless services will accrue throughout the

economy and will lead to the creation of more jobs, increased productivity, and higher growth.⁶

Radio resource management should be regarded as a tool of economic growth. Indeed, few other government policy tools are more highly leveraged in their ability to generate investment and economic growth. It is ironic, therefore, that governments should choose to take ever greater shares of the value-added created by the telecom sector in order to compensate for use of the “scarce public resource” that is the radio spectrum.

This critical linkage suggests that governments, as an element of a systematic pro-growth policy, might even find it advantageous to subsidize telecom investment through various tax concessions. Even if that option is politically difficult and impractical, governments should at least not penalize investment in this cutting-edge, catalytic sector. In this spirit, the recommendations offered here are guided by the beneficial effects of spectrum fees on incentives and opportunities for telecom operators (without regard to technology, type or length of service, etc.) to increase the rate of real capital formation in developing what many nations and development experts regard as “critical infrastructure”.

Goal two: Assure economic efficiency and fairness. Fairness is very much in the eye of the beholder. There is no generally accepted standard for it and, therefore, incorporating it into policy deliberations is a difficult undertaking. Equal charges are in principle fair, but equal in what sense – total fees, fees as a share of revenue, growth over time? A market-oriented test of fairness is appropriate. Fees and their relationship to each other are “fair” if they confer no market advantage on any particular firm, technology or service. Fees should not distort market processes, the choices of users among alternative services, the relative profitability of different companies, or their investment decisions.

Fairness is, therefore, defined in terms consistent with economic efficiency, the efficient use of the scarce spectrum resource, and in a way that allows market efficiency – not government rules and fees – to determine investment and growth of different firms, technologies and services.

⁶ It has been twenty years since the ITU Commission for Worldwide Telecommunications Development headed by Sir Donald Maitland published its Missing Link Report. At that time the ITU called attention to the lack of telecom infrastructure in developing countries and how that deficiency was related to the overall rate of development (income per capita, productivity, industrialization, jobs and economic growth). The Report called attention to multiplier effects linking investment in telecommunications networks, connections to PSTNs, and the rate of economic development. Funds committed to telecom infrastructure create manifold returns in overall economic growth and welfare. The details of the links between telecom infrastructure investment and economic development have been highlighted in countless individual country studies and case reviews in the past twenty years. The core result in Maitland’s study stands unchallenged: Investment in telecom infrastructure is critical to economic growth and development, and is linked to rising living standards.

Goal Three. Adequately compensate government for use of spectrum. There is and will be sentiment and political pressure to set a higher fee for fixed wireless services with limited mobility but to resist reducing the current fees for other cellular, mobile technologies (GSM and CDMA). Short term government budget pressures are real and cannot be ignored, but the recommendation to equalize fees 0.6 times the current CDMA cellular fee seeks to appease those budget concerns. Indeed, but for those budget concerns, this report would have urged equalization at a lower level for all fees. In the context of “compensating government for the use of spectrum”, two other aspects of radio frequency charges are worth noting here.

First, policymakers should recognize that spectrum fees differ in principle and economic impact from fees assessed on the use of other government owned resources (e.g. oil and gas deposits, mining, fisheries, lumber). At the margin, investment in telecom facilities is generally both riskier, and more sensitive to fee levels, than investment in other natural resource sectors. Unlike the exploitation of other types of natural resource, where “economic rents” are generated that can be appropriated in part by government for public use by government with no substantial impact on the intensity and value of use of the national resource, fees on spectrum do not generally come from scarcity rents, and do have an impact on the rate and ways in which the resource is utilized. In other words, investment in many spectrum-based telecom services is much more sensitive to fees than investment in activities using other government resources. Fees from spectrum use, in particular from new technology based services like mobile services, will have a much greater effect on private decision-making and investment than is the case with other government owned natural resources.

Second, given the importance of wireless telecommunications services and infrastructure in creating value in other sectors, lower spectrum charges in the short term can be regarded as longer term government investment with expected returns in the form of higher revenues from other sources. Telecom investment in wireless infrastructure and services will lead to growth in other sources and bases for government revenues through stimulation of taxable economic activities and growth of other tax bases.⁷

6. LONGER TERM RECOMMENDATIONS FOR SPECTRUM MANAGEMENT

This section goes beyond short term recommendations for fee-setting for PT Telkom Flexi service and its relevant competitors, and provides some recommendations of a more fundamental, long-term nature. This includes suggesting guidelines for a revised radio resource management scheme, and guidance for modifying or replacing the existing fee-setting formula.

⁷ One approach might have some spectrum identified as supporting development of “Critical Infrastructures” and on that basis favored with lower, discounted charges for radio frequency use.

The four broad areas of spectrum reform efforts in other countries discussed in Section 3 above, provide a possible roadmap or guiding principles for spectrum management reform in Indonesia. These four areas are:

- Frequency (re) allocation among different technologies or services;
- Services licensing, and assignment of rights to use particular frequencies;
- Establishment of rules governing use; and,
- Monitoring spectrum use and enforcing compliance with rules.

Based on these guiding principles, this report offers three broad recommendations / components for longer term frequency management reform in Indonesia.

a) Review existing frequency allocations among different technologies or services.

An overarching goal of good spectrum management is full, efficient and effective use of all existing bands. In most countries the current allocations reflect a mix of old and new decisions made in the context of changing technological and market conditions. As new applications made possible by new technologies arise it becomes clear that reallocating spectrum from older, lower-valued uses to newer, higher-valued uses is desirable, because doing so increases the total value of all uses of the spectrum. Changing technology makes it possible in many cases to use spectrum more fully and efficiently and thereby to make more spectrum available for other uses and users. Changing technology also creates new services and new demands that cannot always be suitably accommodated within the constraints of existing allocations.

Despite the costs of relocation, and resistance of licensees to doing so, it has in some cases been found to be both feasible and desirable for government to reassign frequencies and reallocate uses and applications. Doing so reflects the changing value of spectrum in alternative uses and is a move toward maximizing the total economic and social value of the scarce spectrum resource.

Reassigning spectrum and relocating services within the scarce frequency continuum will create both winners and losers; costs and benefits. A reallocation will increase the total value of spectrum used if a) it is possible for gains to the winners to offset losses for the losers and b) the transfer of wealth from winners to losers can be efficiently brought about. There may also be instances in which reassignments and more efficient spectrum use can be brought about in ways that result in modest real costs.

Accordingly, a comprehensive study of existing frequency assignments is recommended with the intention of discovering ways of improving overall spectrum utilization, through reassignment of spectrum, and relocation of services where doing so increases overall value. The study should be undertaken from a joint engineering and economic/business perspective. It should focus on: identifying underutilized spectrum; seeking opportunities for creating more value in spectrum use by reassignment and relocation; assessing the costs of relocation

and possibilities for compensating for such costs; and, generally, considering the efficiency and effectiveness, in the context of national spectrum management goals, of current allocations.

b) Reconsider current policies and practices with respect to fees for spectrum use

As discussed above in the context of international experience, the five core questions that need to be addressed when considering spectrum fee policies are:

- 1) What shall be the overall level of fees?
- 2) How shall the overall “burden” for paying fees be distributed among different spectrum bands, technologies, communications sectors and services?
- 3) Who pays?
- 4) What “formulae” are used to calculate fees?
- 5) How will the proceeds be used and by whom?

Current practices should be reevaluated in the context of these questions and, most importantly, in the context of the consensus on national goals that will emerge, hopefully, from discussion and debate on them along the lines advocated above.

Indonesia's current approach to spectrum fee setting

Indonesia's current approach to spectrum fee setting addresses each of the above questions. However, changes in technology, past and future, as well as changes in markets and government policies will continue to undermine the effectiveness of the current approach, and in some ways actually discourage efficient spectrum use. Frequency use fees are currently determined by a formula that was initially developed in 1997 in the context of Indonesia's economic crisis. While modest changes were subsequently made, the method and formulae do not differ in significant respects from those in the original. Presently, charges for rights to use radio frequency (CRURF) are based on several factors. Three are related to power; three are related to bandwidth; one is related to economic zones as defined by per capita income and population density; two are “indexes” allowing for fees to reflect the frequency band, type of use and provider.

Current CRURF determinants in Indonesia

- Bandwidth
- Basic price per unit of Bandwidth (BPBW in Rupiah/KHz)
- L_p = Power Index (type of band; type of service; provider)
- Power
- Basic price per unit of power (BPTP in Rupiah/dBmW of EIRP)
- L_b = BW Index (type of band; type of service; provider)
- Economic zones based on income per capita and population density.

Thus, the current system/scheme provides for some consideration of the specific character of the frequency, the amount of frequency involved, the power of transmitters, region of the country and some economic factors. In some respects, the formula provides for flexibility – for example, through changing the definition of zones, or the indexes. However, in other respects, efforts to keep the formula uniform and simple have made it unduly rigid, and led to the inappropriate similar treatment of dissimilar services.

Critique and suggestions for reforming the current approach

The current formula has been criticized on grounds that it is not based on a coherent set of policy goals and objectives along the lines discussed above. In particular, it the current approach is thought not to promote sufficiently a) economic efficiency (in contrast to engineering efficiency); b) incentives for investment and innovation; c) incentives to build out new technologies rapidly and consistently with the growth and evolution of market demand; or, d) increased connections to the PSTN (teledensity). Some commentators have suggested that current fee arrangements may actually reward inefficiency and discourage efficient spectrum use by, for example, increasing fees in line with increases in the number of repeaters or relays used by operators.

Traditional management schemes throughout the world began with interference-related, engineering inputs derived from technical characteristics of the spectrum – bandwidth, location, power, tower height, coverage, time, and so on. These schemes were then sometimes modified at the margin to reflect non-technical, economic, market and broader policy considerations. Today, however, spectrum reform efforts in the rest of the world give greater weight and consideration to non-technical goals – growth, efficiency, fairness, teledensity and others – while attempting nonetheless to retain all necessary and relevant technical optimization features of earlier approaches.

Similarly, the current fee structure in Indonesia is primarily driven by engineering characteristics, with only secondary consideration given to the economic or “value” characteristics of different spectrum uses. That imbalance should be revised to give equal weight to (a) engineering and (b) economic or “value” considerations. Thus, a revised approach should give more consistent consideration and greater weight to efficiency aspects of spectrum utilization – for example, to minimize “white spaces”, to create penalties for inefficiency and wasteful use of spectrum, and to reward efficient uses and users.

The switch from an engineering perspective to a blended engineering and economic value perspective should attempt to treat “like” services – as perceived by users -- in a similar fashion irrespective of the technology or spectrum bands utilized.

Also, the switch from an engineering perspective to one that gives greater weight to the economic value of alternative uses of the spectrum would require consideration of differences in market characteristics of different licensees. For example, licensees that use the spectrum

for their own corporate uses and as inputs devoted to producing other goods and services (power, mining products, manufactured goods and services industries), should be regarded differently from firms that use the spectrum to produce telecom services for sale. It is good public policy and good economics to make such distinctions in establishing fees and fee burdens.

It is important to distinguish fee formulae from spectrum management. They are not the same and the differences have important implications. A formula for setting fees is only one of many means to achieving the goal of efficient spectrum management. As indicated above, rational spectrum management means considering fees in the context of overall goals; linking fees to licenses and conditions; and, most importantly, making certain that fees do not distort market processes by favoring a particular technology, service or firm.

Adherence to rigid formulae may also lead to fee structures that are inflexible and difficult to change in response to changing technology, changing market demands and changing government policies. Providing for greater flexibility in changing fees should be an integral part of any spectrum reform efforts. Providing temporary or experimental changes is one way to “market-test” changes whose outcomes are uncertain.

Related to the need for flexibility is the need to allow spectrum management techniques generally, and fee structures more particularly, to reflect differences in spectrum uses. Different services and different technologies pose very different problems and opportunities for spectrum managers. Thus, in Indonesia, the radio spectrum is used for broadcasting, paging, radio trunking, cellular services using multiple technologies, wireless local loop, satellite, VSAT, concession radio, amateur radio and experimental radio. It is difficult to construct a single formula applicable across all spectrum bands, all technologies and all services. Efforts to adapt a single formula by changing a single index or multiplier certainly reduce the inflexibility of formulaic approaches, but they do not fully do so. An example of the difficulties of applying a single formula across all services is the use of “power” metrics as a determinant of fees. While doing so may make sense for some technologies and applications (say broadcasting), it does not for others (cellular telephony). One fee structure need not fit all technologies and services.

c) Recovering costs in order to monitor spectrum use and enforce compliance with license terms

Spectrum management is a costly activity. Although one objective of spectrum management should be to adopt efficient management techniques, even then costs can remain substantial. There is a good case for assessing fees based partly on the cost to the government of providing spectrum management services. These management services include:

- All subsidiary tasks of reviewing current assignments,
- Putting together and maintaining adequate data bases characterizing existing uses and users,

- Performing technology assessments,
- Monitoring existing users for compliance and,
- Enforcing regulatory rules and the terms of operators' licenses.

A survey of spectrum management practices in other countries shows that many incorporate in spectrum fees both the direct and indirect costs to government of providing spectrum management services. Consideration of the cost to government of managing the spectrum would lead to an explicit fee element, based on cost, to be included in the overall CRURF. Doing so would also require those funds to be “separated and set aside” from other government fee income, earmarked for return to spectrum managers, and used specifically for spectrum management functions.

d) Continuously evaluate services and firm licensing arrangements

Finally, it is important for Indonesia, on an ongoing basis, both to review existing licensing arrangements in the context of new technologies and opportunities, and to seek guidance and inspiration from efficient spectrum management practices being deployed elsewhere in the world.

License terms should effectively and fully spell out the responsibilities and rights of the licensee, and of the government on whose behalf the license is granted. Many existing licensing arrangements are relatively new and others have not been systematically reviewed in the context of new technologies and opportunities. As suggested earlier, some license terms might usefully be reviewed and coordinated with the fee arrangements for access and use of the spectrum.

As part of the continuing evaluation of spectrum services and licensing that is essential in the telecommunications sector, Indonesia should consider carefully the many new approaches to spectrum management being considered and implemented in other parts of the world.

- Some countries have found ways of combining license fees and spectrum-use fees, and of issuing broader spectrum licenses allowing the licensee to offer different services. Indonesia could look, for example, at the unified licensing approach practiced in India.
- Another possibility is for license conditions to include efficient spectrum use, such as “use it, or lose it” clauses; incentives for efficient use and penalties for inefficient use; opportunities for spectrum sharing and leasing by licensees subject to government imposed conditions; and, in general, looking for ways to promote more flexibility and market orientation in the use of spectrum through innovative licensing terms.